Docket No.: S4-02P15746

CERTIFICATION

I, the below named translator, hereby declare that: my name and post office address are as stated below; that I am knowledgeable in the English and German languages, and that I believe that the attached text is a true and complete translation of the International Patent Application PCT/DE2003/002644, filed 6 August 2003.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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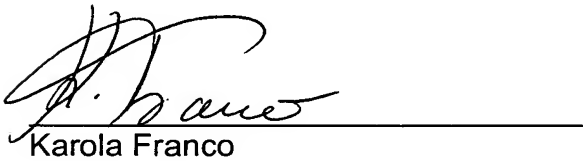

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Air Intake Device

The invention relates to an air intake device, in particular for an internal combustion engine, which is switchable in its effective intake tube length.

An air intake device for internal combustion engines having a collection manifold and intake lines branching off separately to the individual cylinders of the internal combustion engine is known from DE 199 51 083 A1. The intake lines disclosed therein extend into the collection manifold. To each of the intake lines there are assigned first and second intake tube segments which can be swiveled about a rotary axis independently of each other in such a way that in a first position the effective intake tube length, that is to say the area through which the inducted air flows toward the cylinder from the collection manifold, is only the intake line, in a second position the effective intake tube length is that of the intake line and the first intake tube segment, and in a third position the effective intake tube length is the length of the intake line and the first and second intake tube segment.

The object of the invention is to further improve the known air intake device.

The object is achieved by the features of the independent claim. Advantageous embodiments of the invention are characterized in the dependent claims. The subject matter of the independent claim is characterized in that a very high air delivery rate can be achieved over wide speed ranges and

that a very good engine response, e.g. for idle stabilization, is made possible.

Exemplary embodiments of the invention are explained with reference to the schematic drawings, in which:

Fig. 1 shows a first embodiment of the air intake device in a power setting,
Fig. 2 shows the embodiment of the air intake device according to Fig. 1 in a torque setting, and
Fig. 3 shows a further embodiment of the air intake device.

Elements of similar construction and function are represented by the same reference numerals throughout the Figs..

An air intake device which is preferably made of plastic has a first manifold 1 which has a first opening 3 in the area of a flange onto which, for example, a throttle housing or some other inlet housing or output of an air filter can be flanged and via which ambient air can then flow through the opening 3 into the first manifold. Also provided is a first induction duct 5 which is extended from an inlet opening 7 which enters the first manifold 1 to an outlet opening 9. The first induction duct 5 can communicate with an inlet duct of a cylinder head of an internal combustion engine via the outlet opening 9.

Also provided are a second induction duct 11 and a second manifold 13. The second manifold 13 has a second opening 15 and is coupled to the second induction duct 11. The second induction duct 11 and the second manifold 13 can be coupled to each other by means of, for example, a screw connection with a seal, but they can also be joined to each other by

welding or by gluing or other types of joining. Preferably, however, the second manifold 13 and the second induction duct 11 are embodied as a single piece, i.e. integrally.

The second induction duct 11 and consequently also the second manifold 13 are pivotally mounted and can be swiveled by means of a drive (not shown) into a first and second pivoting position. A suitable drive for use in this case is preferably what is known as a switchable vacuum-controlled diaphragm box. However, any other drive known to the person skilled in the art, such as an electric motor, for example, can be provided.

When the second induction duct 11 is in a first pivoting position, the air to be inducted by the internal combustion engine flows through the first opening 3 into the first manifold 1 and from there into the first induction duct 5. It then flows further through the first induction duct 5 and out through the outlet opening 9. From there it flows out into an inlet duct of the cylinder head and finally into a cylinder of the internal combustion engine if the air intake device is flanged onto the cylinder head of an internal combustion engine.

When the second induction duct 11 is in a second pivoting position (Fig. 2), the air to be inducted by the internal combustion engine flows through the first opening 3 and directly on through the second opening 15 into the second manifold 13. From the second manifold 13 the air flows on through the second induction duct 11 and finally into the first induction duct 5 and through the latter to the outlet opening 9.

In the second pivoting position the first opening 3 and the second opening 15 are coupled to each other to form a sealed connection. In the present exemplary embodiment the first and second opening 3, 15 are in alignment with each other and sealed by means of a first gasket 17 in such a way that no air can flow through the first opening 3 and onward into the first manifold 1. However, the first and second outlet opening 3, 15 can also be dimensioned differently, the essential thing being only that in the second pivoting position of the second induction duct 11 the air flows directly from the first opening 3 into the second manifold 13.

In the second pivoting position the second induction duct 11 and the first induction duct 5 are also coupled to each other to form a sealed connection. This is ensured by a second gasket 19 which forms a seat in the second pivoting position in the area of the inlet opening 7.

With the present air intake device, the first manifold 1 can be dimensioned such that for the so-called "power position" which corresponds to the first pivoting position of the second induction duct 11 a suitably large manifold volume is available for the very high filling requirement. The second manifold 13 can be dimensioned independently thereof and is advantageously dimensioned such that it has a small volume compared to the first manifold, thus resulting in a very good engine response, e.g. for idle stabilization at low speeds.

Fig. 3 shows a further embodiment of the air intake device which differs from that according to Fig. 1 and 2 in that a third induction duct 21 is provided in addition to the first induction duct 5 and the second induction duct 11. The third

induction duct 21 is likewise pivotally mounted. With this embodiment the effective intake tube length can be varied in three stages: firstly, in the so-called power position, in which the air flows from the first manifold 1 directly into the first induction duct 5; secondly, in an intermediate position for medium speed ranges in which the air flows through the first manifold 1 into the third induction duct 21 and from there directly into the first induction duct 5. In this position the third induction duct 21 is then coupled to the first induction duct 5 so as to form a seal. For this purpose a gasket 23 is provided which forms a seat in the area of the inlet opening 7 of the first induction duct. At high speeds, in a third or in a further pivoting position, the first induction duct 5 is then coupled to the third induction duct 21 and the latter is in turn coupled to the second induction duct 11. In this pivoting position the first and second openinges are then once again coupled to each other so as to form a seal, with the result that the air flows through the second manifold 13 into the second induction duct 11 and from there into the third induction duct 21 and subsequently into the first induction duct 5.

In addition to the three induction ducts represented here further induction ducts can of course be provided, said induction ducts being embodied and arranged accordingly such that further effective intake tube lengths can be similarly implemented.